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SPECIFICATION FOR CABLE TERMINATIONS FOR AUTOMOBILE WIRING

PART II BULLET AND TUBE CONNECTORS

First Reprint NOVEMBER 2007
(Including Amendment No 1)

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NEW DELHI 110002

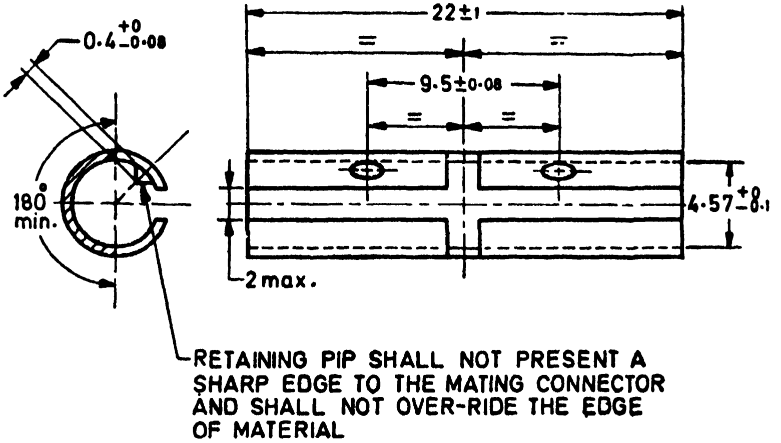
Gr 4 *July* 1977

AMENDMENT NO. 1 DECEMBER 1979
TO
IS : 8395 (Part II)-1977 SPECIFICATION FOR CABLE TERMINATIONS FOR AUTOMOBILE WIRING

PART II BULLET AND TUBE TYPE CONNECTORS

Alteration

(*Page* 5, *Fig.* 2) — Substitute the following for the existing figure:



RETAINING PIP SHALL NOT PRESENT A SHARP EDGE TO THE MATING CONNECTOR AND SHALL NOT OVER-RIDE THE EDGE OF MATERIAL

All dimensions in millimetres.

FIG. 2. TUBE TYPE CONNECTOR

(ETDC 14)

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PART II BULLET AND TUBE TYPE CONNECTORS

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(*Continued on page* 2)

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SPECIFICATION FOR CABLE TERMINATIONS FOR AUTOMOBILE WIRING

PART II BULLET AND TUBE TYPE CONNECTORS

0. FOREWORD

0.1 This Indian Standard (Part II) was adopted by the Indian Standards Institution on 24 February 1977, after the draft finalized by the Automobile Electrical Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard covers dimensional and performance requirements and methods of tests for bullet and tube type cable connectors with insulating sleeve used in automobile electrical wiring.

0.3 This standard covers bullet and tube type connectors. Blade type connectors (male and female) are covered in Part I of this standard.

0.4 In formulating this standard, assistance has been derived from Doc : 48B (Secretariat) 88 'Specification for flat, quick-connect terminals' issued by the International Electrotechnical Commission.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part II) specifies the dimensions, requirements and tests for bullet and tube type electrical cable connectors with insulating sleeve for a maximum continuous current rating of 17·5 A for use in automobile electrical wiring.

---

*Rules for rounding off numerical values (*revised*).

2. TERMINOLOGY

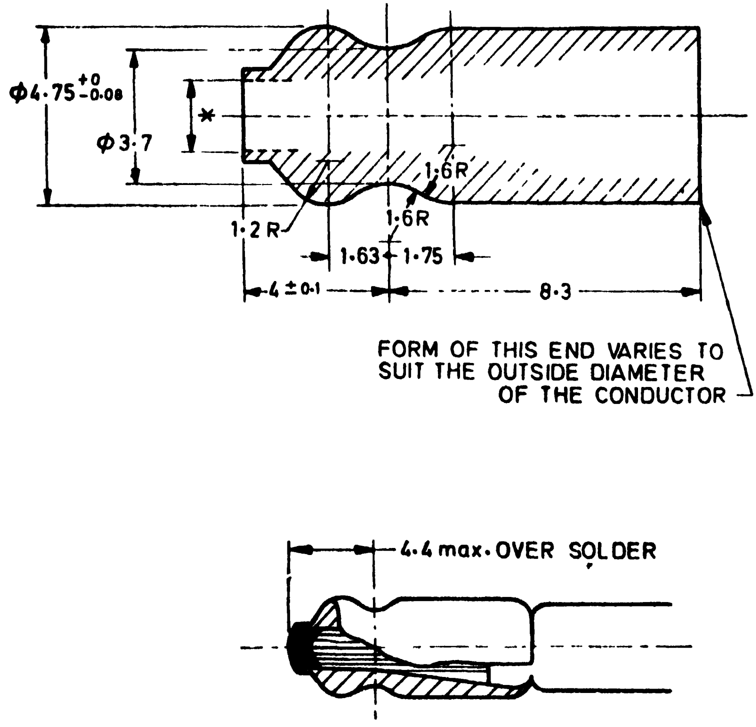
2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Type Tests — Tests carried out to prove conformity with the specification. These are intended to prove the general qualities and design of a given type.

2.2 Acceptance Tests — Tests carried out on samples taken from a lot for the purpose of acceptance of the lot.

3. DIMENSIONS

3.1 The dimensions of the bullet, tube and insulating sleeve shall be as given in Fig. 1 to 3.



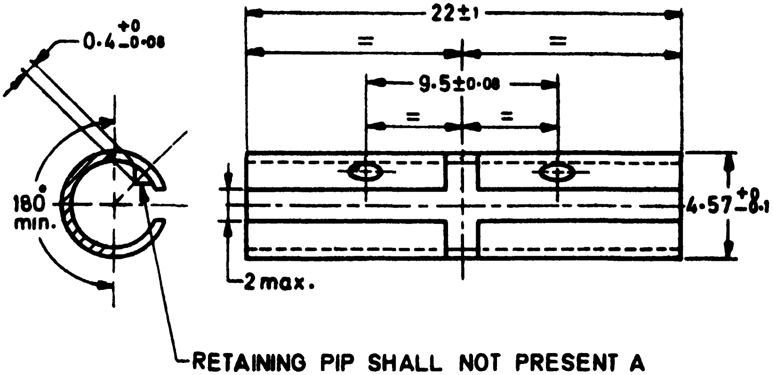
ϕ4·75 +0 −0.08
ϕ3·7
*
1·6R
1·2 R
1·6R
1·63
1·75
4 ±0·1
8·3
FORM OF THIS END VARIES TO SUIT THE OUTSIDE DIAMETER OF THE CONDUCTOR
4·4 max·OVER SOLDER

SECTION OF NIPPLE AFTER SOLDERING AND SWAGING

All dimensions in millimetres.

*This dimension to suit conductor.

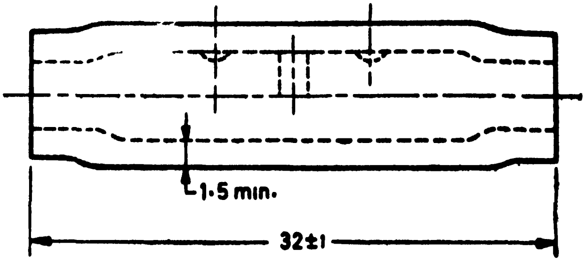
Fig. 1 Bullet Type Connector



RETAINING PIP SHALL NOT PRESENT A SHARP EDGE TO THE MATING CONNECTOR AND SHALL NOT OVER-RIDE THE EDGE OF MATERIAL

All dimensions in millimetres.

FIG. 2 TUBE TYPE CONNECTOR



All dimensions in millimetres.

FIG. 3 TUBE CONNECTOR FITTED WITH INSULATING SLEEVE

4. MATERIAL AND FINISH

4.1 Bullet Connector — The bullet connector shall be manufactured from soft brass of the grade CuZn38Pb3 of IS : 319-1968*. After manufacture, the connector shall be coated with tin to a thickness of not less than 0·01 mm.

---

*Specification for free-cutting brass rods and sections (*second revision*).

4.2 Tube Connector — The material and finish of the tube connector shall be as agreed between the purchaser and the manufacturer.

4.3 Insulating Sleeve — Insulating sleeve of suitable material and finish shall be provided for tube connector as agreed between the manufacturer and the purchaser. It shall have sufficient stiffness to avoid interference while assembling the bullet to the tube connector.

It shall prevent accidental insertion of bullet connector between the sleeve and tube connector.

5. MARKING

5.1 The following information shall be marked on the connectors or on the packing containing the connectors:

a) The name and/or trade-mark of the manufacturer, and

b) Type designation.

5.1.1 The product may also be marked with Standard Mark.

5.1.2 The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufactures or producers may be obtained from the Bureau of Indian Standards.

6. TESTS

6.0 Classification of Tests

6.0.1 *Type Tests* — The following shall constitute type tests:

a) Test for insertion — withdrawal (*see* 6.2),

b) Test for salt spray (*see* 6.3),

c) Test for crimp strength (*see* 6.4), and

d) mV drop test (*see* 6.5).

6.0.2 *Criteria for Approval* — Thirty samples shall be submitted for type tests together with the relevant data. The testing authority shall issue a type approval certificate if the connectors are found to comply with the requirements of tests given in 6.0.1.

6.0.3 The samples shall be subjected to the tests in the following manner:

a) Test for insertion-withdrawal	10 samples
b) Test for salt spray	5 samples
c) Test for crimp strength	5 samples
d) mV drop test	10 samples

6.0.4 In case of failure of one or more type tests, the testing authority may call for fresh samples not exceeding twice the number of original samples and subject them to the test(s) in which failure occurred. If, in repeated test(s) no failure occurs, the tests may be considered to have been satisfied.

6.0.5 *Acceptance Tests* — The acceptance tests shall constitute:

a) Dimensional check-up (*see* **6.1**), and

b) Test for insertion — withdrawal (*see* **6.2**)

NOTE — The number of samples for acceptance tests shall be as agreed upon between the purchaser and the manufacturer. However, the recommended plan of sampling is given in Appendix A.

6.1 Dimensional Check-Up — Bullet and tube type connectors shall be dimensionally checked up in conformity with Fig. 1 to 3.

6.2 Test for Insertion — Withdrawal

6.2.1 When a bullet connector is inserted into each end of the tube connector the initial insertion force of each bullet connector shall be:

a) not more than 100 N with insulating sleeve fitted to the tube connector, and

b) not less than 40 N with the insulating sleeve removed from the tube connector.

6.2.2 After 10 reconnections, the withdrawal force of each bullet connector with insulating sleeve removed from the tube connector shall not be less than 20 N.

6.3 Test for Salt Spray — When an assembly consisting of a bullet connector inserted into each end of a tube connector without an insulating sleeve is subjected to the test as given in Appendix B for two periods, each consisting of 24 hours exposure followed by one hour drying at room temperature the assembly shall, upon completion of this test, fulfil the requirements of **6.5**.

6.4 Test for Crimp Strength

6.4.1 New samples shall be used for each conductor size to be tested. Each connector shall be crimped to its associated conductor with a crimping tool which has been adjusted in accordance with the manufacturer's instructions.

6.4.2 The force required to separate a connector from its associated conductor shall be as given in Table 1.

TABLE 1 REQUIREMENTS OF CRIMP STRENGTH TEST

NOMINAL CROSS-SECTIONAL AREA OF FLEXIBLE INSULATED CONDUCTORS (1)	MINIMUM FORCE REQUIRED TO SEPARATE THE CONNECTOR FROM ITS ASSOCIATED CONDUCTOR (2)
mm^2	N
0·65	89
1	125
1·5	165
2	231
2·5	254

NOTE — Maximum diameter over insulation shall be 3·45 mm.

6.5 mV Drop Test — When a continuous current, as specified in Table 2, is passed through an assembly consisting of a bullet connector inserted into each end a tube connector without an insulating sleeve and voltage readings taken by means of a millivoltmeter connected to the exposed skrit of each bullet connector are noted initially and after 10 withdrawals of the assembly, the maximum difference between two voltage readings shall not exceed the values as given in Table 2.

TABLE 2 MILLIVOLT DROP TEST VALUES FOR BULLET AND TUBE TYPE CONNECTOR

CONTINUOUS CURRENT (1)	MINIMUM CONDUCTOR SIZE (2)	INITIAL MILLIVOLT DROP (3)	MAXIMUM DIFFERENCE IN MILLIVOLT DROP BETWEEN INITIAL READING AND THE READING AFTER 10 WITHDRAWALS (4)
A	mm^2	mV	mV
5	0·65	4	3
10	1	6	5
17·5	2·5	10	8

APPENDIX A

(*Clause* 6.0.5)

RECOMMENDED PLAN OF SAMPLING

A-0. GENERAL

A-0.1 If statistical quality control techniques have been used for production control, such test results and relevant charts may be made available along with the material supplied to enable the purchaser to judge the acceptability or otherwise of a lot. In case such information is not available, the following procedure is recommended for judging conformity of a lot with the requirements of this specification.

A-1. SCALE OF SAMPLING

A-1.1 Lot — In any consignment, all the connectors of the same size and from the same batch of manufacture shall be grouped together to constitute a lot.

A-1.2 The number of connectors to be selected from a lot shall depend upon the lot size and shall be in accordance with col 1 and 2 of Table 3.

NOTE — The sampling plan recommended here assures that lots with 3 percent or less defectives would be accepted most of the times and lots with defectives above 20 percent would be rejected most of the times.

TABLE 3 SIZE OF SAMPLE AND CRITERION FOR CONFORMITY

(*Clauses* A-1.2 *and* A-3.1)

LOT SIZE N (1)	SAMPLE SIZE n (2)	PERMISSIBLE NUMBER OF DEFECTIVES (3)
Up to 200	15	1
201 „ 300	20	1
301 „ 500	30	2
501 „ 800	40	3
801 „ 1 300	55	3
1 301 and above	75	4

A-1.3 These connectors shall be selected at random. In order to ensure randomness, the following procedure may be adopted (*see also* IS : 4905-1967*):

> Arrange the connectors in a systematic manner and starting from any connector count them as 1, 2 ......, etc, up to *r*, *r* being equal to the integral part of *N*/*n*, *N* being the lot size and *n* the sample size. Every *r*th connector shall be included in the sample.

A-2. NUMBER OF TESTS

A-2.1 All the connectors selected under **A-1.2** shall be subjected to acceptance tests given in **6.0.5**.

A-3. CRITERION FOR CONFORMITY

A-3.1 A lot shall be considered as conforming to this specification, if the number of connectors out of those tested, failing to satisfy the requirements of any one or more of acceptance tests, does not exceed the corresponding number given in col 3 of Table 3.

APPENDIX B

(*Clause* 6.3)

TEST FOR SALT SPRAY

B-1. PROCEDURE

B-1.0 The ability of the connector to withstand corrosion due to atmospheric conditions shall be assessed by the following test.

B-1.1 The chamber for this test shall be so constructed that the salt spray is produced in the lower part of the chamber, in the upper part of which the samples to be exposed are suspended.

B-1.2 The spray shall be produced by an atomizer employing compressed air free from all impurities.

B-1.3 The ceiling, the walls and all other parts of the chamber shall be so constructed and the parts under test so arranged that no condensate can drip on the test specimen.

---

*Methods for random sampling.

B-1.4 The salt solution shall be a 5-percent solution of sodium chloride in water.

B-1.5 The connector shall be sprayed in such a chamber at the standard temperature 27°C, for a cycle of 50 hours consisting of two periods of 24 hours each and one hour draining period.

B-1.6 After removal from the salt spray chamber, the connector shall not show any sign of corrosion or electrolytic action which will adversely affect the functioning of any part of the device.

B-1.7 In general, a salt spray chamber described as follows would be suitable. Details of such chamber and the spraying mechanism are shown in Fig. 4 and 5 respectively:

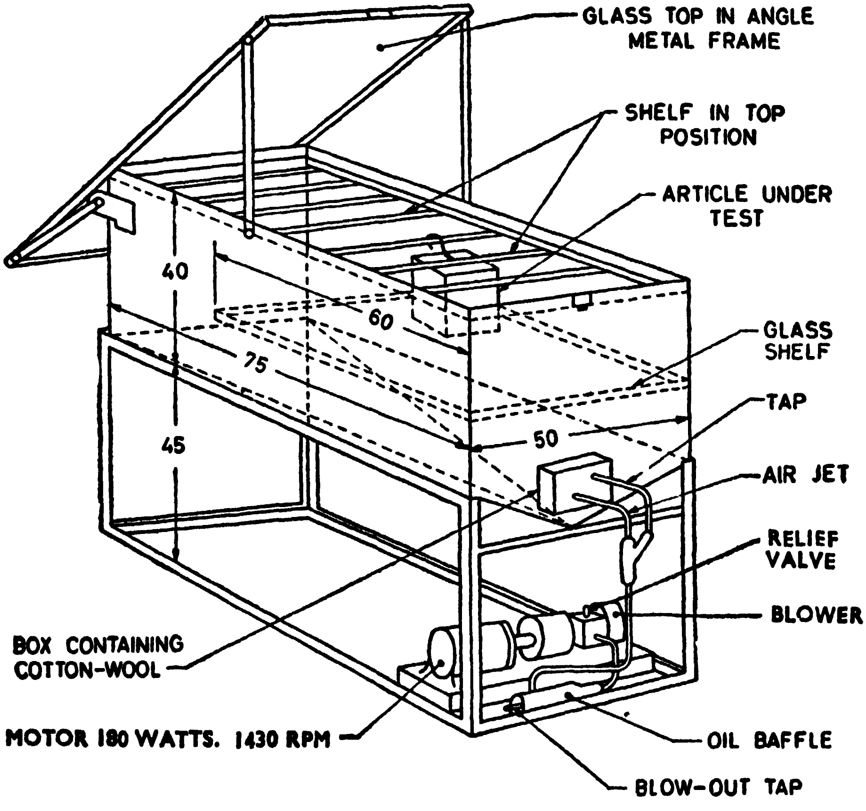
a) The cabinet should approximately be of the dimensions shown in Fig. 4, and the cabinet and its internal fittings should be made of monel metal or other suitable material. A shelf is required, which should be capable of being fitted in the upper or lower part of the cabinet;

b) The air used for atomizing the salt solution shall be clean. The pressure during the tests shall be between 20 kN/m^2 and 35 kN/m^2. The pressure may be adjusted by a relief valve or by the pressure outlet of the blower;

c) The nozzle for atomizing the salt solution shall be adjusted for maximum amount of spray. This adjustment may be carried out by unscrewing the bottom locknut *B*, on the lower nozzle *C*, and adjusting this nozzle into position until maximum spray occurs. The diameter of the nozzles shall be 1·5 mm. A tap and second branch in the air line is available for agitating the salt solution as required;

d) The spraying apparatus shall be capable of atomizing not less than 1 450 ml of salt solution per hour. The quantity of solution sprayed per cubic metre capacity of the test chamber shall be approximately 177 ml per minute; and

e) The container filled with cotton-wool acts as a breather and provides an outlet for the air which is constantly being pumped into the chamber, the cotton-wool acting as a filter and preventing salt mist from being discharged into the atmosphere.



All dimensions in centimetres.

FIG. 4 SALT SPRAYING CHAMBER

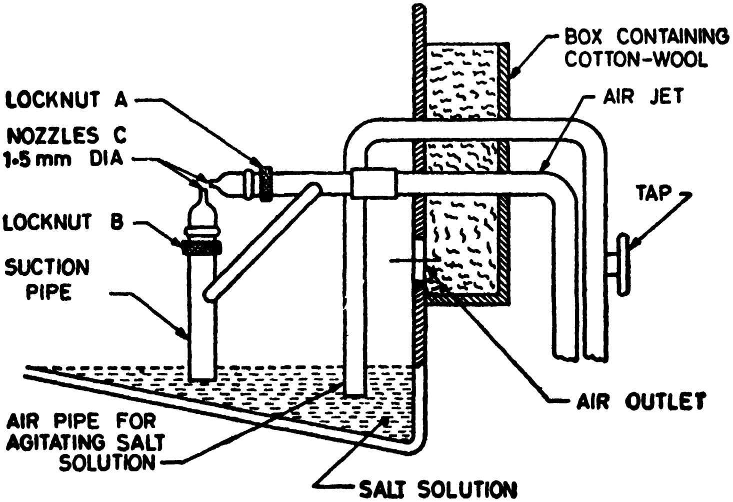


FIG. 5 DETAILS OF SPRAYING ARRANGEMENT

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